

**In the Claims:**

- 1 1. (Currently Amended) A method of [[for generating water]] decreasing the con-  
2 centration of fuel in a fuel cell system comprising the steps of:  
3 introducing a carbonaceous fuel to a catalyst in the presence of oxygen;  
4 reacting at least a portion of said fuel with said oxygen on said catalyst to pro-  
5 duce water, carbon dioxide and heat; and using at least a portion of said water to dilute  
6 said fuel.
- 1 2. (Original) A water generator for a fuel cell system comprising:  
2 a housing;  
3 a substrate;  
4 means for introducing oxygen into said housing;  
5 means for introducing fuel or fuel solution into said housing;  
6 means for reacting said fuel or fuel solution with said oxygen to  
7 produce carbon dioxide, water and heat;  
8 means for mixing said water with said fuel to form dilute fuel; and  
9 means for removing said water from said water generator.
- 1 3. (New) A water generating assembly, comprising:  
2 a source of carbonaceous fuel;  
3 a source of oxygen;  
4 a catalyst;

5 means for introducing carbonaceous fuel from said source of carbonaceous fuel and means for introducing oxygen from said source of oxygen in the presence  
6 of said catalyst to oxidize the fuel, producing carbon dioxide, water and heat.

1 4. (New) The water generating assembly as defined in claim 3 further comprising  
2 a control system for controlling the amount and introduction of at least one of fuel  
3 and oxygen to said catalyst.

1 5. (New) The water generating assembly as defined in claim 3 wherein said catalyst  
2 is disposed on an element, which may include a substrate.

1 6. (New) The water generating assembly as defined in claim 5 wherein said element  
2 is a substrate.

1 7. (New) The water generating assembly as defined in claim 3 wherein said catalyst  
2 is disposed at one of the following: within a chamber, in a chamber, and on an aspect of a  
3 chamber.

1 8. (New) The water generating assembly as defined in claim 3 used with an associated direct oxidation fuel cell wherein said catalyst is disposed within the anode chamber  
2 of said fuel cell.  
3

1 9. (New) The water generating assembly as defined in claim 3 used with an associated direct oxidation fuel cell wherein said catalyst is disposed within the cathode chamber  
2 of said fuel cell.  
3

1 10. (New) The water generating assembly as defined in claim 3 wherein said carbo-  
2 naceous fuel includes methanol.

1 11. (New) The water generating assembly as defined in claim 6, wherein said sub-  
2 strate is a tubular substrate.

1 12. (New) The water generating assembly as defined in claim 11 wherein said tubular  
2 substrate includes fluted walls.

1 13. (New) The water generating assembly as defined in claim 11, wherein said  
2 catalyst is disposed on an exterior aspect of said tubular substrate, and said tubular sub-  
3 strate is coupled with said source of fuel in such a manner that fuel is introduced into an  
4 interior aspect of said tubular substrate whereby some of said fuel passes from the interior  
5 aspect of said tubular substrate to said catalyst on the exterior aspect and the fuel reacts  
6 with oxygen, producing carbon dioxide, water and heat.

1 14. (New) The water generating assembly as defined in claim 13, wherein said cata-  
2 lyst is applied to at least a first portion of said tubular substrate and at least one second  
3 portion of the exterior aspect is exposed and is catalyst free such that water produced on  
4 said exterior aspect passes back into the interior aspect of said tubular substrate.

1 15. (New) The water generating assembly as defined in claim 13, wherein said exte-  
2 rior aspect of said tubular substrate is enclosed with a liquid-impermeable, gas-permeable  
3 material forming an enclosure defining a space between the exterior aspect and the enclo-  
4 sure as a water generation and collection area.

1 16. (New) The water generating assembly as defined in claim 15, wherein said enclo-  
2 sure provides either a pressure or a concentration gradient across the tubular substrate,  
3 and where carbon dioxide produced by oxidation of said fuel is released from the enclo-  
4 sure through the liquid-impermeable, gas-permeable material enclosing said tubular sub-  
5 strate.

1 17. (New) The water generating assembly as defined in claim 11, wherein said tubu-  
2 lar substrate has said catalyst disposed on an interior aspect of said tubular substrate that  
3 is coupled with said source of fuel in such a manner that fuel and oxygen are introduced  
4 to the interior aspect of said tubular substrate whereby carbon dioxide, water and heat are  
5 produced on the interior aspect of said tubular substrate.

1 18. (New) The water generating assembly as defined in claim 17 wherein said tubular  
2 substrate is comprised of a gas-permeable, liquid-impermeable material such that water,  
3 heat and carbon dioxide are generated at the interior aspect of said tubular substrate and  
4 carbon dioxide generated passes out through walls of said tubular substrate.

1 19. (New) The water generating assembly as defined in claim 18, wherein oxygen is  
2 introduced to the catalyst through said tubular substrate.

1 20. (New) The water generating assembly as defined in claim 17, wherein at least  
2 one portion of said tubular substrate is left uncatalyzed so that excess air and carbon di-  
3 oxide may pass through to an exterior aspect of said tubular substrate resulting in liquid  
4 water being collected, substantially gas-free on an interior aspect of the gas-permeable,  
5 liquid-impermeable material.

- 1    21.    (New) A direct oxidation fuel cell system, comprising:  
2            (A)    a direct oxidation fuel cell having  
3                    (i)    a catalyzed membrane electrolyte, having an anode aspect and a  
4 cathode aspect;  
5                    (ii)    a fuel cell housing enclosing said fuel cell with an anode chamber  
6 being defined between said anode aspect of the catalyzed membrane electrolyte and a  
7 first exterior portion of said cell housing, and a cathode chamber being defined between  
8 said cathode aspect of the catalyzed membrane and a second exterior portion of said fuel  
9 cell housing;  
10           (B)    a fuel source coupled to said fuel cell that delivers a carbonaceous fuel  
11 substance to said fuel cell;  
12           (C)    a source of oxygen, coupled to said fuel cell;  
13           (D)    a water generating assembly in communicating relationship with said fuel  
14 source, said source of oxygen, and said fuel cell;  
15           (E)    a controller in communicating relationship with said water generating as-  
16 sembly and said fuel cell that controls the introduction of fuel, oxygen and  
17 water selectively into said water generating assembly to generate water;  
18 and  
19           (F)    a load detachably coupled across said fuel cell such that when said fuel  
20 cell is generating electricity, said load is coupled across said fuel cell, and  
21 power produced by said fuel cell is delivered to said load.
- 1    22.    (New) The direct oxidation fuel cell system as defined in claim 21 wherein said  
2 water generating assembly is disposed between said fuel source and said anode chamber  
3 of said direct oxidation fuel cell and further includes a control system for controlling the  
4 amount and introduction of fuel and oxygen to said water generating assembly and to said  
5 fuel cell.

1 23. (New) The direct oxidation fuel cell system as defined in claim 22 wherein said  
2 control system includes one of the following: a valve, or a valve assembly that includes  
3 means for controlling the opening and closing of one or more valves in the valve assem-  
4 bly.

1 24. (New) The direct oxidation fuel cell system as defined in claim 21 wherein said  
2 carbonaceous fuel substance includes methanol.

1 25. (New) The direct oxidation fuel cell system as defined in claim 21 further com-  
2 prising said water generating assembly being coupled to said anode chamber of said di-  
3 rect oxidation fuel cell in such a manner that water that is produced may be selectively  
4 added to said anode chamber to control the concentration of fuel.

1 26. (New) The direct oxidation fuel cell system as defined in claim 25 wherein said  
2 water may be delivered to said anode chamber by the operation of one of the following: a  
3 valve, or a valve assembly that includes means for controlling the opening and closing of  
4 one or more valves in the valve assembly.

1 27. (New) The direct oxidation fuel cell system as defined in claim 21 further com-  
2 prising said water generating assembly being coupled to said cathode chamber of said  
3 direct oxidation fuel cell in such a manner that oxygen may be selectively introduced into  
4 said cathode chamber, and when combined with fuel in the presence of the cathode aspect  
5 of the catalyzed membrane, produces water.

1 28. (New) The direct oxidation fuel cell system as defined in claim 27 wherein said  
2 water may be delivered to said cathode chamber by the operation of one of the following:  
3 a valve, or a valve assembly that includes means for controlling the opening and closing  
4 of one or more valves in the valve assembly.

1 29. (New) The direct oxidation fuel cell system as defined in claim 21 wherein said  
2 water generating assembly is in fluid communication with said fuel source and said fuel  
3 cell.

1 30. (New) The direct oxidation fuel cell system as defined in claim 29 wherein said  
2 fluid communication includes a first conduit connected between said water generating  
3 assembly and said fuel source, and a second conduit connected between said fuel source  
4 and said direct oxidation fuel cell.

1 31. (New) The direct oxidation fuel cell system as defined in claim 30 further com-  
2 prising at least one of the following: a first fluid flow controller for controlling the intro-  
3 duction of fuel through said first conduit to said water generating assembly, and a second  
4 fluid flow controller for controlling the fluid flow through said second conduit from said  
5 water generating assembly to said direct oxidation fuel cell.

1 32. (New) The direct oxidation fuel cell system as defined in claim 31 wherein said  
2 at least one of said first and second fluid flow controllers includes at least one of the fol-  
3 lowing: a valve, and a valve assembly that includes means for controlling the opening  
4 and closing of one or more valves in the valve assembly.

1 33. (New) The direct oxidation fuel cell system as defined in claim 29 wherein said  
2 fluid communication includes a first conduit connected between said water generating  
3 assembly and said fuel source, and a second conduit connected between said water gener-  
4 ating assembly and said direct oxidation fuel cell, and a third conduit connected between  
5 said fuel source and said direct oxidation fuel cell.

1 34. (New) The direct oxidation fuel cell system as defined in claim 33 further com-  
2 prising at least one fluid flow controller for controlling the introduction of fluids into or  
3 through one of said first, second and third conduits.

1 35. (New) The direct oxidation fuel cell system as defined in claim 34 wherein said  
2 fluid flow controller includes one of the following: a valve, or a valve assembly that in-  
3 cludes means for controlling the opening and closing of one or more valves in the valve  
4 assembly.

1 36. (New) The direct oxidation fuel cell system as defined in claim 21 wherein said  
2 water generating assembly is a substrate that has a catalyzed surface and said substrate is  
3 comprised of a substantially fuel-permeable, carbon dioxide impermeable material such  
4 that fuel can permeate through, but carbon dioxide is trapped and is thus directed out  
5 through associated outlet ports in said fuel cell, while generated water remains in said  
6 anode chamber, or can be directed as desired in said fuel cell system.

1 37. (New) The direct oxidation fuel cell system as defined in claim 21, wherein said  
2 water generating assembly is a substrate that has a catalyzed surface and said substrate is  
3 comprised of a substantially gas-permeable, liquid impermeable material, such that gases  
4 can travel through said substrate, but water cannot travel through said substrate.

1 38. (New) A direct oxidation fuel cell and water generating system, comprising:  
2 a housing;  
3 a source of fuel in fluid communication with said housing;  
4 a source of oxygen in fluid communication with said housing;



5 a membrane electrode assembly having a catalyzed membrane electrolyte, with an  
6 anode aspect and a cathode aspect, disposed within said housing, an anode chamber being  
7 defined between said anode aspect of the catalyzed membrane electrolyte and a first exte-  
8 rior portion of said housing, and a cathode chamber being defined between said cathode  
9 aspect of the catalyzed membrane electrolyte and a second exterior portion of said hous-  
10 ing; and

11 a controller for adjusting the introduction of fuel from said fuel source into said  
12 housing and for adjusting the introduction of oxygen from said oxygen source into said  
13 housing to determine whether said system functions to generate electricity or to generate  
14 water.

1 39. (New) The system as defined in claim 38 further comprising:

2 a load detachably coupled across said fuel cell which load receives power from  
3 said fuel cell in an electricity generating mode.

1 40. (New) The system as defined in claim 38 further comprising:

2 an adjustable oxygen port in said housing that can be closed to prevent oxygen  
3 from entering said housing.

1 41. (New) The system as defined in claim 40 further comprising a fuel inlet port in  
2 fluid communication with the anode chamber of said fuel cell, and when said controller  
3 operates to introduce fuel and oxygen into said anode chamber, the system functions in a  
4 water generating mode at said anode chamber.

1 42. (New) The system as defined in claim 40 wherein said adjustable oxygen port is  
2 closed to prevent oxygen from entering said anode chamber , and said controller operates

3 to introduce fuel into the anode chamber of the fuel cell, a load is connected across the  
4 fuel cell such that the system functions in an electricity generating mode.

1 43. (New) The system as defined in claim 40 wherein said adjustable oxygen port is  
2 closed to prevent oxygen from entering said anode chamber, and said controller operates  
3 to introduce fuel into the anode chamber of the fuel cell, a load is uncoupled and not con-  
4 nected across the fuel cell such that there is fuel crossover and the system functions in a  
5 water generating mode at the cathode chamber.

1 44. (New) The system as defined in claim 43 further comprising means for periodi-  
2 cally varying the load attached to the system in order to periodically induce fuel cross-  
3 over, resulting in the generation of water.

1 45. (New) The system as in claim 38 wherein said system functions in a water gener-  
2 ating mode and is coupled to another fuel cell to deliver water to the anode of the fuel  
3 cell.

1 46. (New) The method as defined in claim 1 including the further step of controlling  
2 the amount of fuel that is delivered to said catalyst.

1 47. (New) The method as defined in claim 1 including the further step of controlling  
2 the amount of oxygen that is delivered to said catalyst.

- 1 48. (New) The method as defined in claim 1 including the further step of:  
2 disposing a water generating assembly including a catalyst in said direct oxidation  
3 fuel cell system between said source of fuel and said fuel cell, and providing a control  
4 system that controls the amount and introduction of fuel, and oxygen to said water gener-  
5 ating assembly and said fuel cell.
- 1 49. (New) The method as defined in claim 48 including the further step of operating  
2 said control system such that said fuel cell generates electricity.
- 1 50. (New) The method as defined in claim 48 including the further step of utilizing  
2 water generated to adjust the concentration of methanol in said fuel cell.
- 1 51. (New) A method of employing a direct oxidation fuel cell system as a combined  
2 power generator, and water generator including the steps of:  
3 (A) providing a housing;  
4 (B) providing a source of fuel in fluid communication with said housing;  
5 (C) providing a source of oxygen in fluid communications with said housing;  
6 (D) providing a membrane electrode assembly having a catalyzed membrane  
7 electrolyte, with an anode aspect and a cathode aspect, disposed within  
8 said housing, an anode chamber being defined between said anode aspect  
9 of the catalyzed membrane electrolyte and a first exterior portion of said  
10 housing, and a cathode chamber being defined between said cathode as-  
11 pect of the catalyzed membrane electrolyte and a second exterior portion  
12 of said housing;  
13 (E) determining whether said system functions to generate electricity or to  
14 generate water; and

15 (F) controlling the introduction of fuel and oxygen into said housing as  
16 needed to cause said system to function to either generate electricity or to  
17 generate water.

1 52. (New) The method of employing a direct oxidation fuel cell system as a com-  
2 bined power generator, and water generator as defined in claim 51 including the further  
3 step of: introducing fuel and oxygen into said anode chamber to oxidize said fuel  
4 and to produce water, but no electricity.


1 53. (New) The method of employing a direct oxidation fuel cell system as a com-  
2 bined power generator, and water generator as defined in claim 51 including the further  
3 step of:  
4 adjusting the introduction of oxygen in such a manner that oxygen is not intro-  
5 duced into the anode chamber;  
6 adjusting the introduction of fuel into said anode chamber such that fuel is added  
7 to said anode chamber; and  
8 connecting a load across said membrane electrode assembly such that power pro-  
9 duced is delivered to said load.

1 54. (New) The method of employing a direct oxidation fuel cell system as a com-  
2 bined power generator, and water generator as defined in claim 51 including the further  
3 step of:  
4 adjusting the introduction of oxygen in such a manner that oxygen is not intro-  
5 duced into the anode chamber;  
6 adjusting the introduction of fuel into said anode chamber, while not connecting a  
7 load across said membrane electrode assembly, such that fuel is added to said anode  
8 chamber to induce fuel cross over and to generate water in said cathode chamber.

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Respectfully submitted,

  
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